number of clear days was 16, of partly cloudy days 7, cloudy days 8, and rainy days but 5. The total number of hours of sunshine for the district determined from the records at 15 regular weather bureau stations was 226, which is 65 per cent of the possible amount. The maximum number of hours of sunshine occurred at Raleigh, N. C., where the percentage of the possible amount was 79 per cent.

RIVER CONDITIONS.

The flow of most of the rivers of Virginia and the Carolinas was decidedly below the normal during October, 1912. The Lynch and Santee Rivers in South Carolina were high at the beginning of the month owing to heavy rains at the close of September, but soon declined and no noteworthy rises occurred during the remainder of the month. The rivers were also low in Georgia, Alabama, and Mississippi, responding only moderately to the general rains of the 13th–14th and 18th–19th.

WINTER WEATHER IN FLORIDA—A COURTEOUS REJOINDER.[1]

WINTER WEATHER IN FLORIDA.

Florida, widely advertised as having "perpetual summer," or as one railroad puts it, "where every day is a June day," has been generally regarded as having a fountain of perpetual something or other ever since the days of Ponce de Leon. Its real climate, however, did not receive careful attention until large numbers of settlers were attracted by the recent land boom. In A. J. Henry's "Climatology of the United States" it is stated that in 1886 and 1894 frost destroyed practically all citrus fruits in the State, and in 1895 and 1899 trees in the northern counties were killed in that manner. During the past century there have been at least seven severe freezes in the State, during two of which, 1835 and 1899, practically a zero temperature prevailed over the interior of the northern and western counties. Snow has fallen over the greater portion of the State, and on February 7, 1835, when a temperature of 7° above zero was recorded in Jacksonville, the St. Johns River was frozen. A temperature of —2° F. has been recorded within the State. In all but 8 of the last 70 years freezing temperatures have occurred in Jacksonville. January last, an extremely cold month over much of the United States, was also severe in Florida. The isotherm of freezing reached as far south as the middle of the peninsula on the 16th. At Miami, latitude 26° N., the most southerly city on the mainland of the United States, frost was recorded on February 11. As a winter resort contrast Florida with certain parts of California. According to official reports, 42° F. was the lowest temperature recorded during January at both San Francisco and Los Angeles.

WINTER WEATHER IN FLORIDA.

By A. J. MITCHELL, Section Director, Jacksonville, Fla.

Under the above caption in Science for May 31, 1912, Mr. Andrew H. Palmer submitted some observations on Florida weather. The winter of 1911–12, in Florida, was by no means severe, but the temperature averaged low during January and February, as compared with the normal, the monthly departures during the winter months being: December, +5.1°; January, −0.6°, and February, −4.6°.

Mr. Palmer's statement that "Florida's climate did not receive careful attention until large numbers of settlers were attracted by the recent land boom," is rather gratuitous. For 40 years the weather bureau records of Florida have been consulted by people of broad intelligence in their search for truth regarding the climatology of the State. With regard to the statement: "In all but 8 of the last 70 years freezing temperatures have occurred in Jacksonville," a few supplementary facts are essential to a correct understanding. Mr. Palmer's figures were correctly copied from "Climatology of the United States," but included in that report were miscellaneous records that antedate those of the Weather Bureau, and, though given official cognizance to the extent of publication, yet the official life of local weather bureau data begins with the establishment of a station in Jacksonville in 1871. The records previous to 1871 were mostly by voluntary observers, and they are not recognized as coordinate in importance with those compiled under official supervision during subsequent years; hence to a certain extent they are taken cum grano salis. A freezing temperature in Jacksonville is not followed, necessarily, by similar conditions in the citrus belt, for Jacksonville sustains, approximately, the same relation to the rest of the State as Sacramento, Cal., does to the San Diego section.

The above qualifications are pertinent also in the matter of snowfall in Florida. During the severe blizzard of February, 1899, snow fell over the extreme northern portion of the State to the depth of several inches; that is, over an area of slightly more than 1° in latitude. This was the heaviest snowfall in Florida of which there is authentic record, and it is believed to be an expression of maximum intensity along that line. Certainly it was not exceeded during the century.

Mr. Palmer points out further: "The St. Johns River was frozen." My, that was a cold wave, indeed! The St. Johns River is from 1 to 5 miles wide, and 20 to 40 feet deep, with the usual tidal conditions that obtain in streams contiguous to the ocean. That this river, in latitude 30° N., should freeze over is a new science item of wonderful potentiality. Ice may have formed near the fringe of the river during the severe weather of 1835, but the St. Johns freezing, never! "Climatology of the United States," by Prof. Henry, stated: "The St. Johns was frozen several rods from the shore," quite a distinction from "The St. Johns was frozen."

As to the formation of frost at Miami on February 11, 1912, as alleged by Mr. Palmer, it is sufficient to say that the minimum temperature at Miami on the date named was 51°.

Florida covers an area of about 6° in latitude. Winter storms of the southwest type occasionally dip far southward, and, when followed by "highs" of great magnitude, it is obvious that wide temperature ranges must be the sequence to the rapidly shifting areas of high and low barometric pressure. Be it remembered, however, the most of the cold waves that reach the Gulf coast leave no icy touch over the lower peninsula. The great upper drift seems to pull the northern portion of our "highs" more rapidly eastward than the southern portion, thereby frequently converting what appeared primarily as an ominous condition into a harmless change of northeast winds and cloudy weather.

In contrasting Florida and California as winter resorts Mr. Palmer was unfortunate in his citation of temperatures, and, inferentially at least, left the impression that California, during the winter of 1911–12, was the elysian field of climatic perfection. Invidious comparisons are

[1] The article "Winter Weather in Florida," by Mr. Andrew H. Palmer, appeared in Science for May 31, 1912, under Notes on Meteorology and Climatology, and the reply by Mr. A. J. Mitchell in Science for Nov. 15, 1912.

not in good taste, but Weather Bureau records are paths that lead to truth, so let the record speak. Mr. Palmer states that 42° was the lowest temperature recorded at Los Angeles during January. Official records show, however, that 39° occurred on February 27, and 38° on December 31, 1911, and these figures represent a state of inversion, the temperature nearer the ground being 8° to 10° lower. In fact, Riverside recorded 21°, San Bernardino 19°, and Redlands 24° on December 26, 1911. The temperature of −2° at Tallahassee, Fla., in February, 1899, occurred during a condition that marked an epoch in the climatic history of the country. Tallahassee, however, is in the "hill country," quite 200 miles from the citrus belt. Coincident with the zero temperature at Tallahassee were minima of only 24° to 28° in what is now an important section of the citrus belt.

Parenthetically, I will say there is no issue between California and Florida. Their inheritance and common destiny are the same. Florida rejoices in California's countless resources and great prosperity, and, forsooth, she has learned a lesson from her business acumen and studied frugality. Aye, more, Florida is even willing to follow where California leads, provided the objective be unity and prosperity, justice and equality.

Florida's hopes and aspirations are not builded on the misfortunes of others, but, like California, they rest securely in the public's knowledge of her resources, and in the wonderful possibilities arising from a climate that offers success to the industrious, hope and comfort to the afflicted.

Florida, however, has her "ups" and "downs." The cold wave of December, 1911, so damaging to the Pacific coast, did not reach this State, but its counterpart is found in the cold waves of the nineties, which swept this section with great severity.

The matter of the weather recurring in cycles has not been established as a fundamental fact, Bruckner to the contrary, notwithstanding. The "long ranger" has spent his force, and until puny man is able to revolutionize the mechanics of the atmosphere the rainmaker will continue to bombard space with negative results. Hence, we must continue to rely on the governmental agency, the Weather Bureau, for timely warnings of impending changes. Lightwood knots are still plentiful in Florida, and coal and oil seemingly so in California. The utilization of these, supplemented by intelligent action, will circumvent, to a large extent, any lasting damage from even extreme boreal conditions.